A Rising Tide Lifts All Boats:
Community Planning and Climate Adaptation

Hydrographic Services Review Panel
Wednesday, November 19, 2008

Briefing Delivered by

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National Oceanic and Atmospheric Administration (NOAA)
Coastal Services Center

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Threat of Sea Level Rise

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Coastal Communities: Vital to U.S. and International Economies

- 57 percent of the U.S. gross domestic product (GDP) is contributed by coastal watershed counties.
- 13 of the 20 largest cities worldwide are coastal port cities.
- Coastal counties contain 53 percent of the nation's population—but account for only 17 percent of U.S. land area (excludes Alaska).
- Coastal areas are becoming more densely populated and developed.

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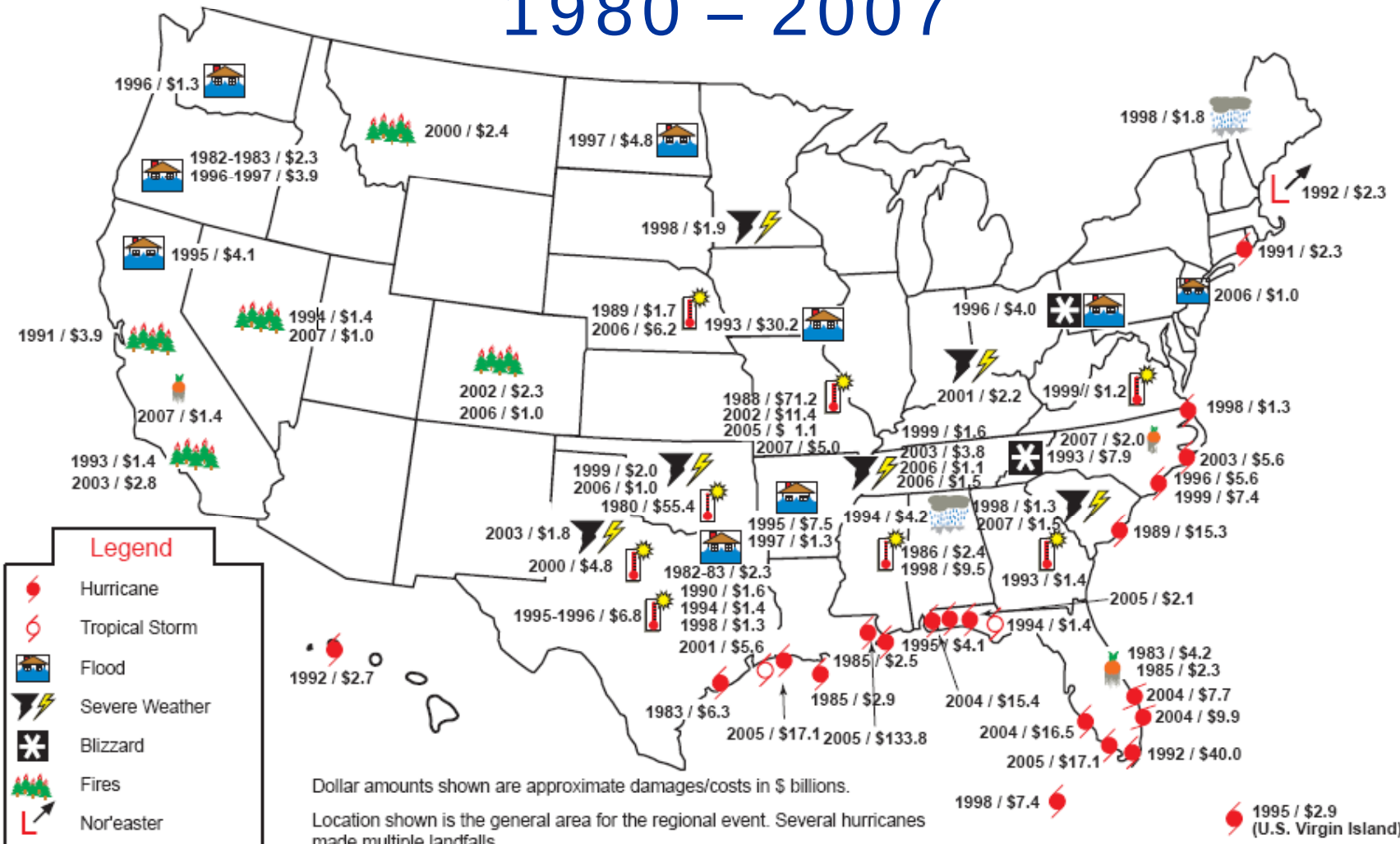
Billion Dollar Weather Disasters 1980 – 2007



Dollar amounts shown are approximate damages/costs in $ billions.

Location shown is the general area for the regional event. Several hurricanes made multiple landfalls.

Additional information for these events is available at NCDC WWW site www.ncdc.noaa.gov/ol/reports/billionz.html

The U.S. has sustained 78 weather related disasters over the last 28 years with overall damages/costs exceeding $1.0 billion for each event. 66 of the disasters occured during or after 1990. Total costs for the 78 events were 600 billion using a GNP inflation index.

NOAA's
National Climatic Data Center

The Human Dimension

- Understanding people's perceptions and what they value to promote risk-wise behavior.
- Community resilience: helping communities prepare for, or adapt to, change—and to withstand the next event.
- Raising the level of community understanding:

"I don't think they understand how bad it can be."

– Local emergency manager

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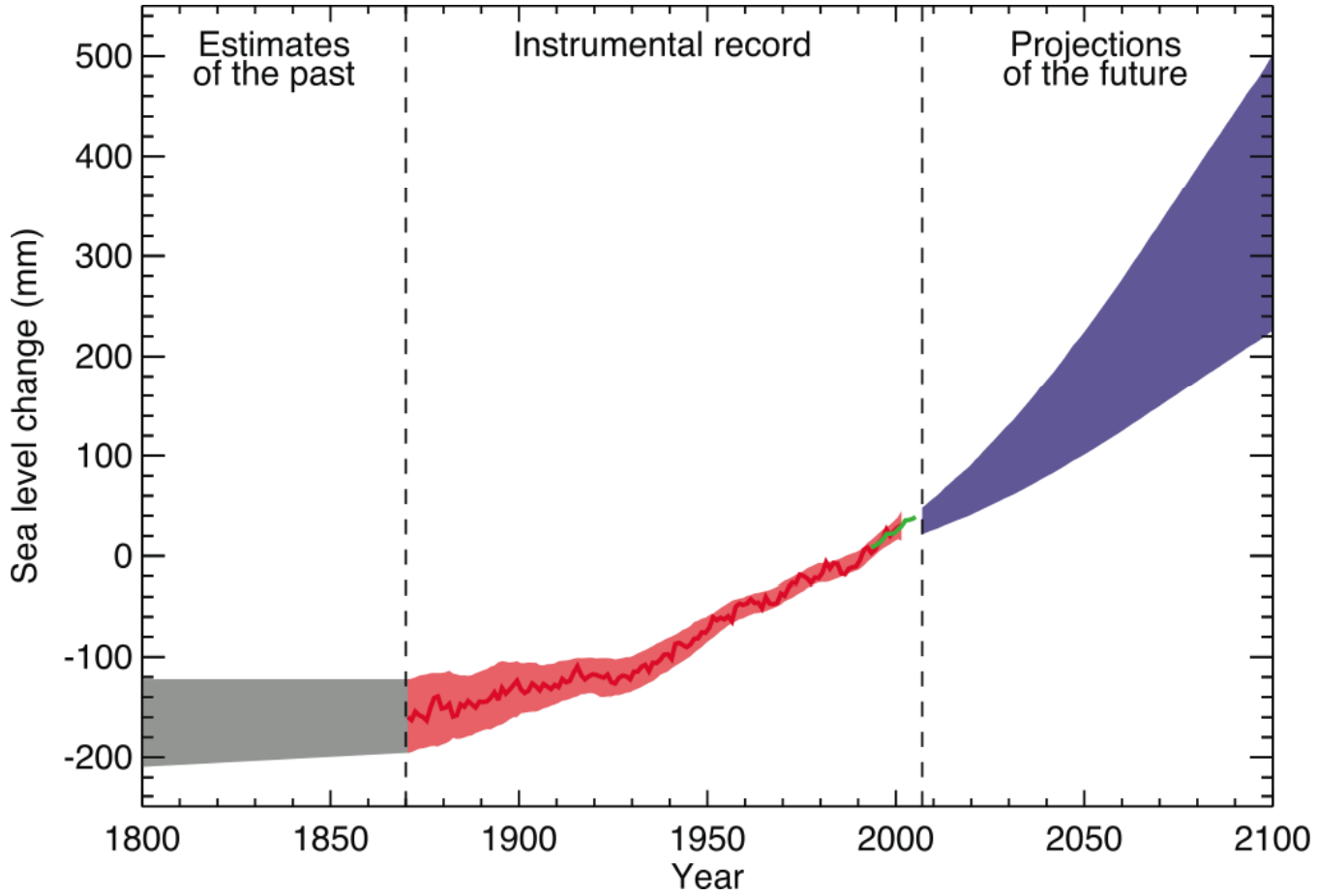
Projected Sea Level Rise Scenarios



"Future vulnerability depends not only on climate change but also on development pathway."

– Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report

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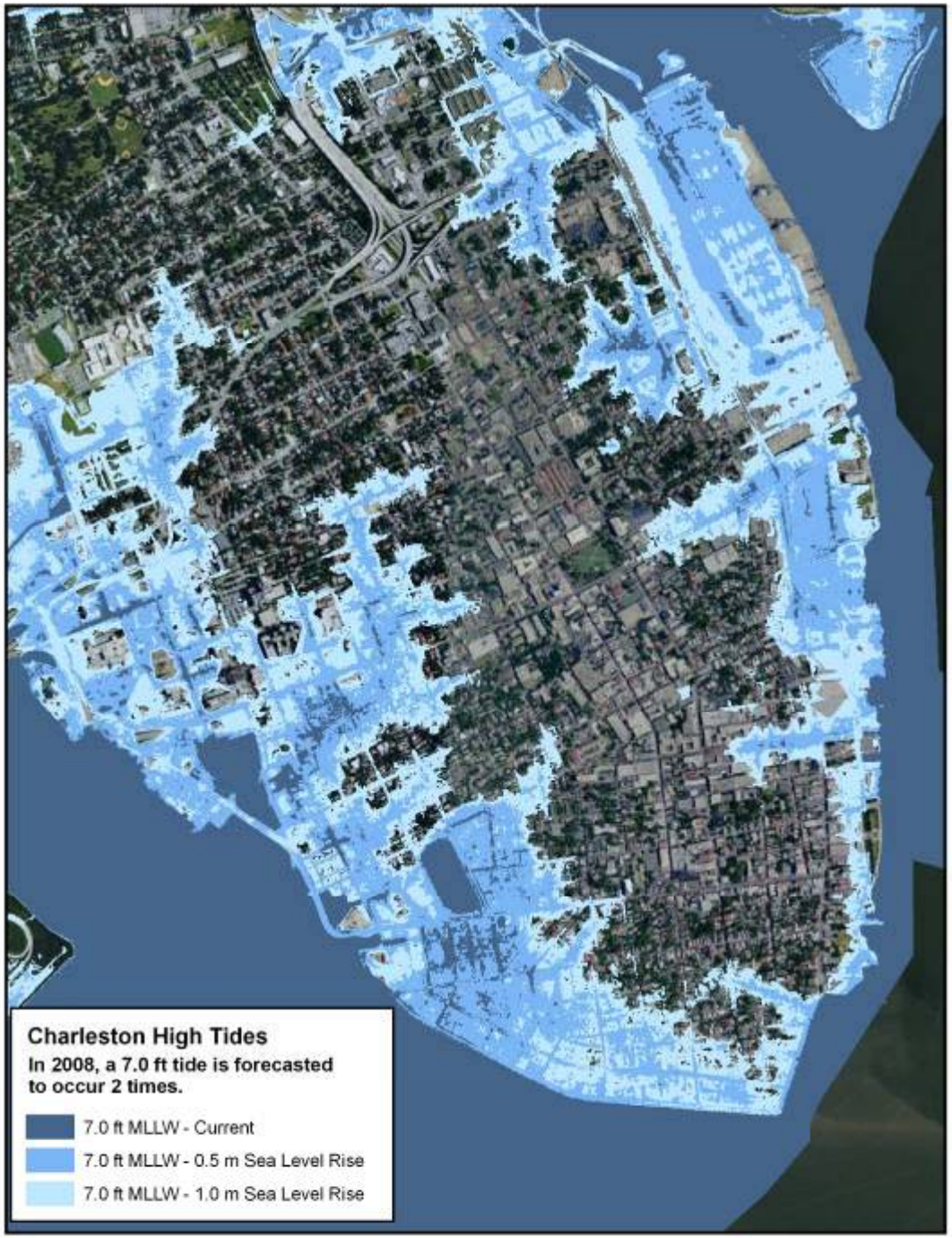

Tidal Variability

"Models used to date do not include uncertainties in climate-carbon cycle feedback, ***nor do they include the full effects of changes in ice sheet flow, because a basis in published literature is lacking."***

– Intergovernmental Panel on Climate Change (IPCC), Fourth Assessment Report

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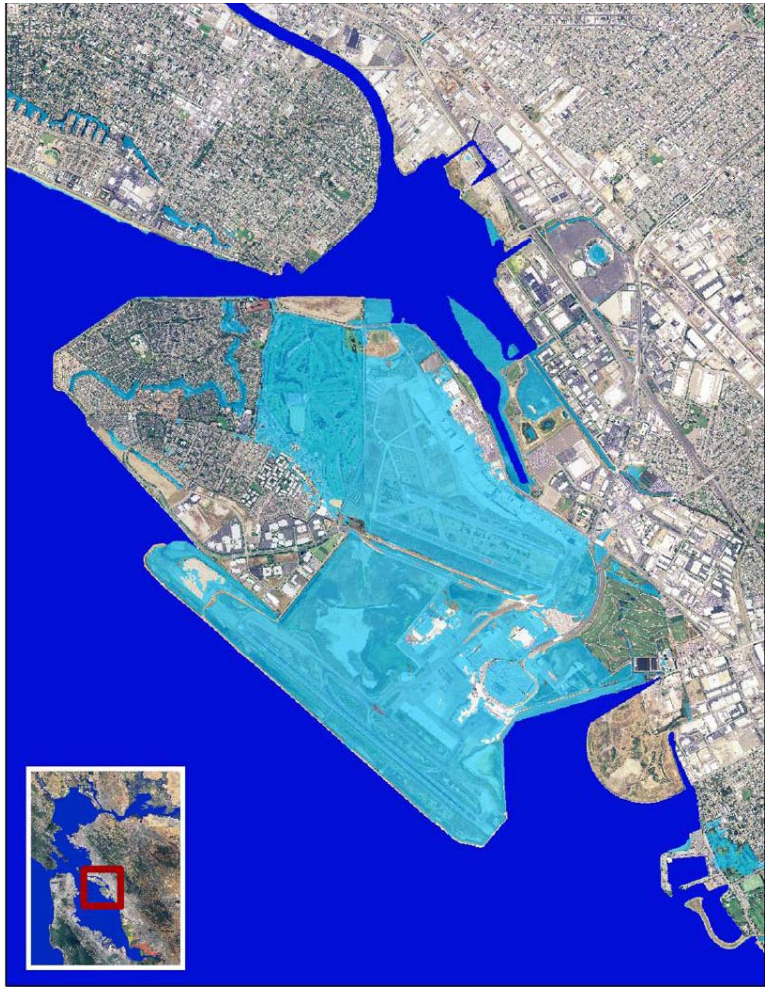
San Francisco Bay Sea Level Rise Scenarios



San Francisco Bay

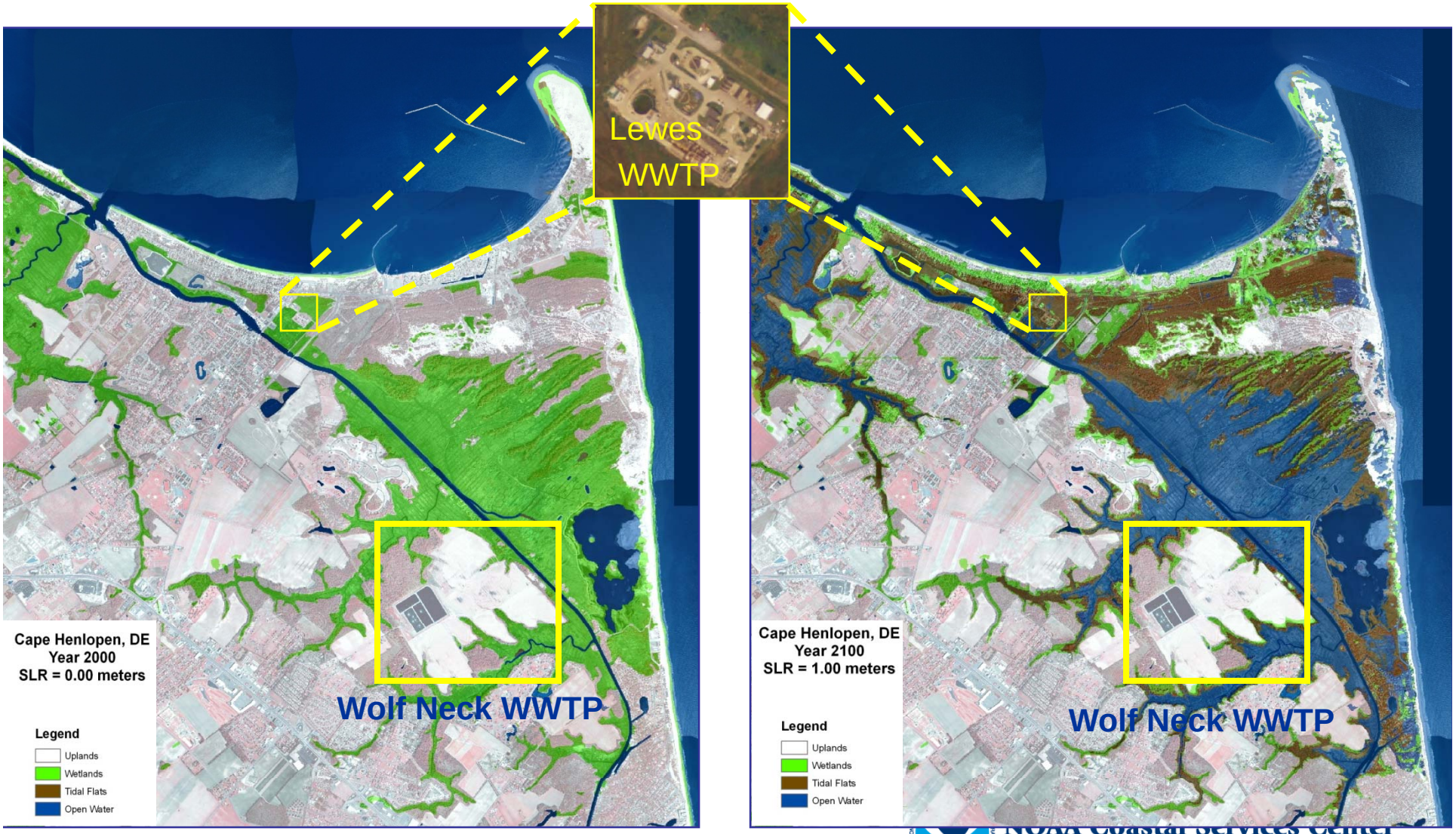
1 m sea level rise

N

bcdc

Map is based on USGS 2m DSM and National Agriculture Imagery Program data. Map is illustrative and depicts a potential inundation scenario in 2100. Limitations in the geospatial data available may effect accuracy. Map should not be used for planning purposes.

Local Impact Prediction / Vulnerability Assessment



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Courtesy of David Carter, Delaware CZM

Another Dutch Quote

"Lord give us this day our daily bread and every once in a while a flood… so people are reminded of the risks they still face."

– Marcella Laguzzi, head, Section Flood Protection, province of South Holland

Translation: Complacency is one of our greatest foes.

Coastal Infrastructure

Why Develop a Sea Level Rise Plan?

Potential Climate Change Effects in Coastal States Include:

- Increased shoreline erosion
- Increased storm damage and changes in storm intensity
- Saltwater intrusion into groundwater aquifers
- Infrastructure (sewer, roadway, utilities) damage
- Changes in ocean currents
- Habitat loss (especially coastal wetlands) and changes to fish and wildlife populations

Preparing to adapt to these changes ensures the safety of citizens, environment, and economy.

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Courtesy of David Carter, Delaware CZM

What Do You Need to Develop Geospatial Tools Addressing Sea Level Rise?

Water level data

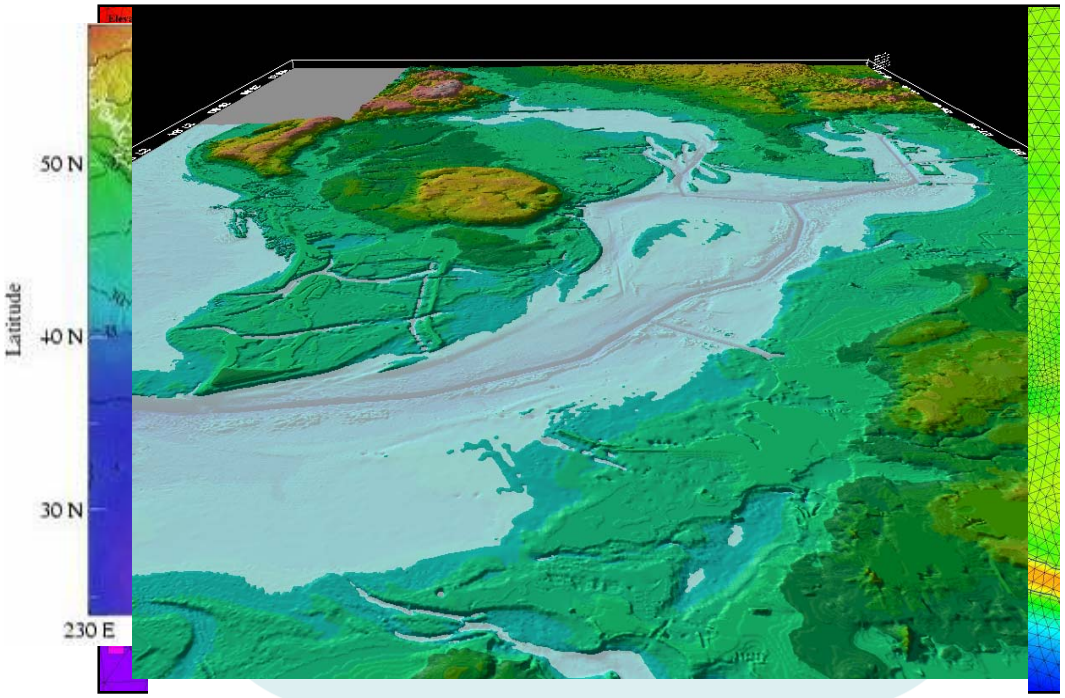
Geodetic Data

Geophysical data

Models

Transformation programs

Geographic information system (GIS) applications



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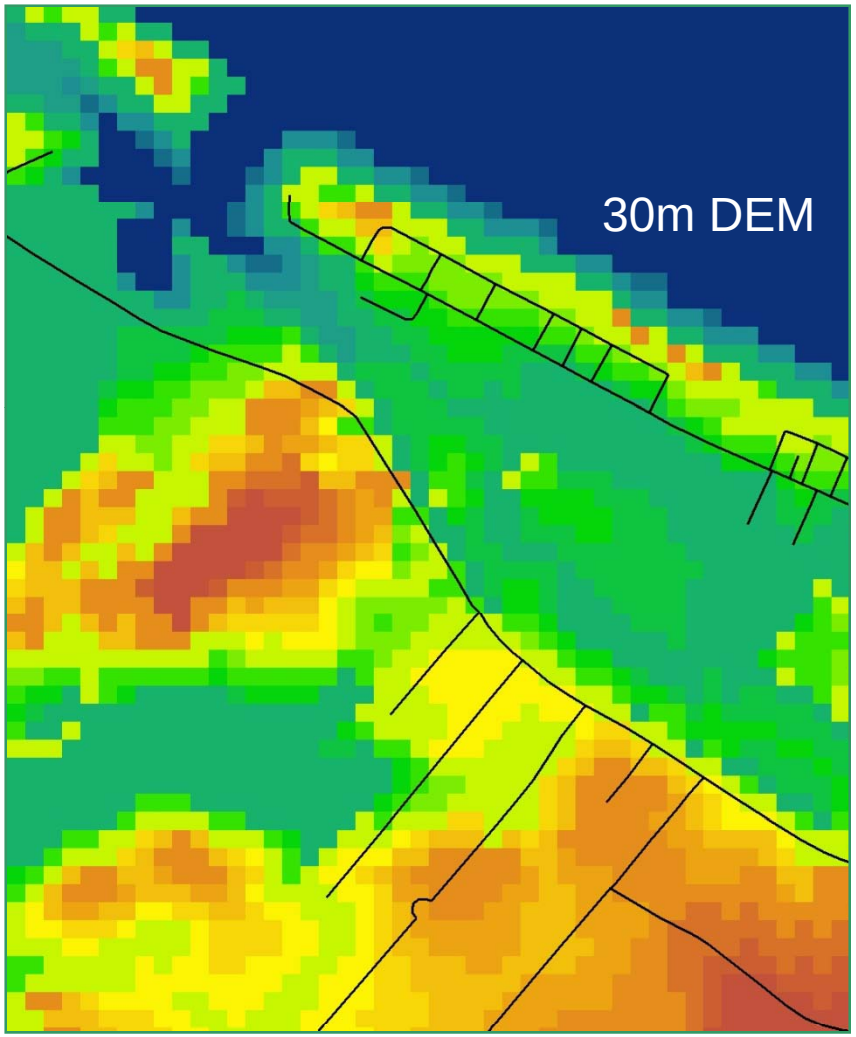
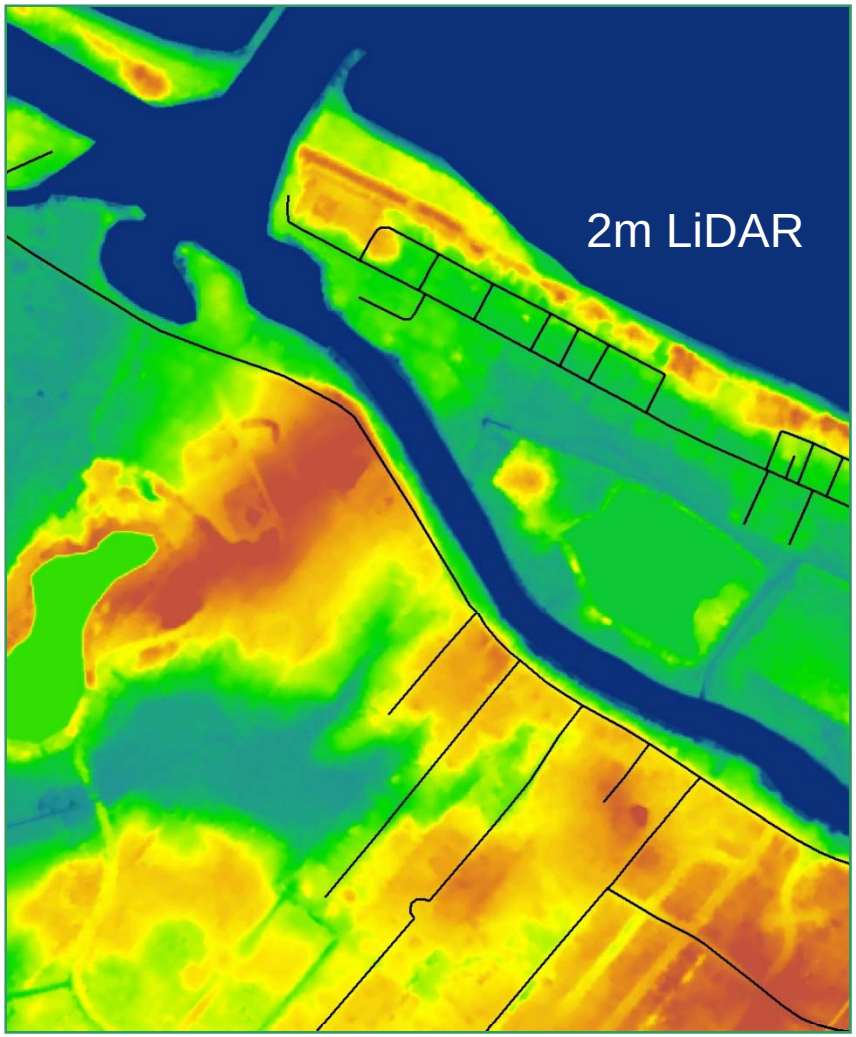
Higher Resolution Equals Better Data





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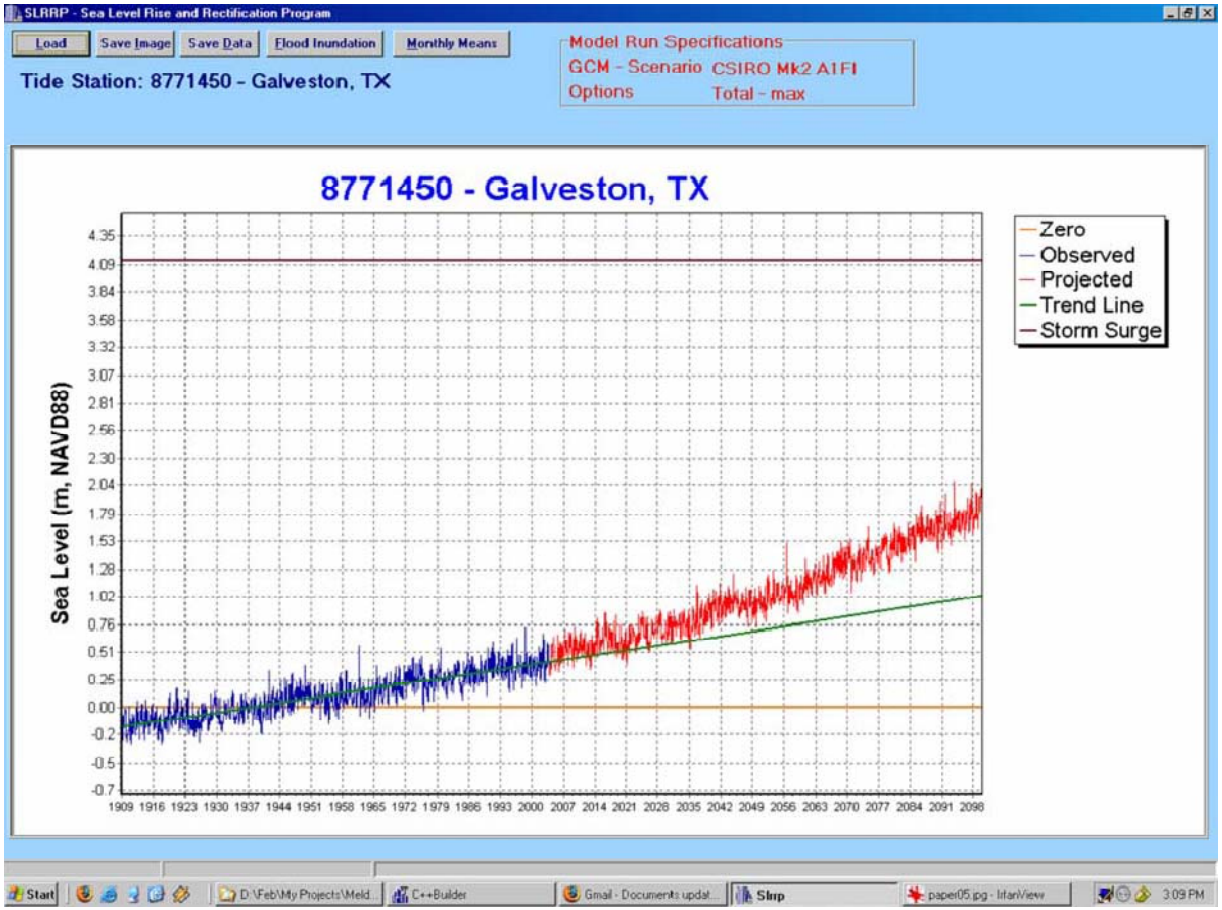
Courtesy of David Carter, Delaware CZM

Sea Level Rise Rectification Program (SLRRP)

- Generates a suite of future sea level projections from various global climate models and scenario outputs from the IPCC
- Incorporates historical tide gage record for local variability



USGS science for a changing world

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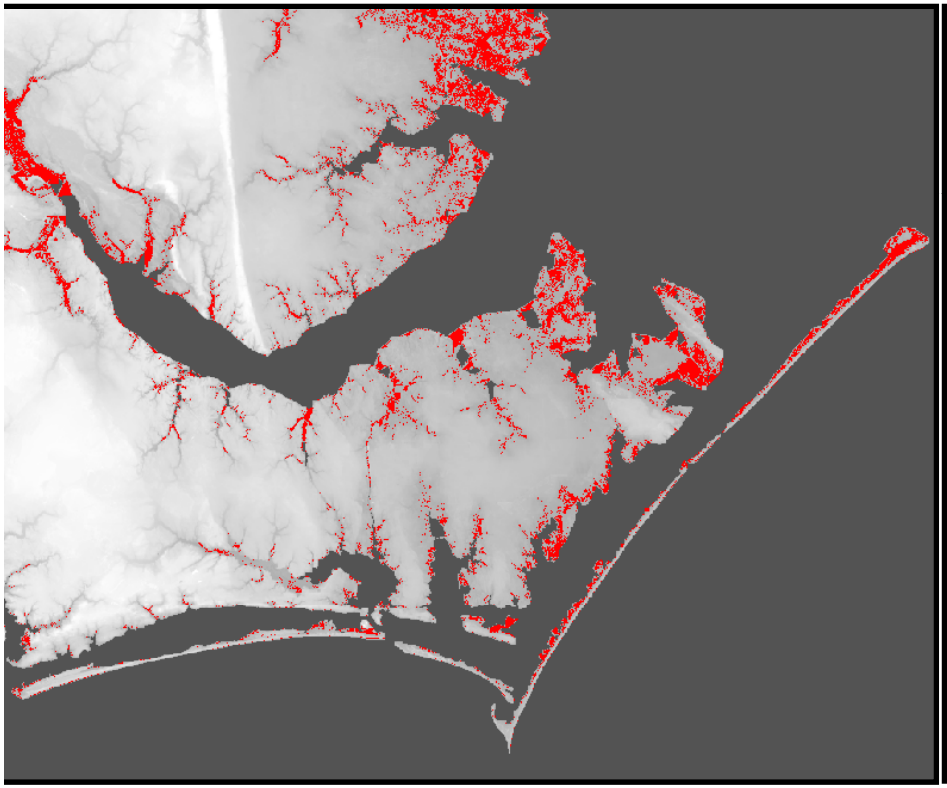
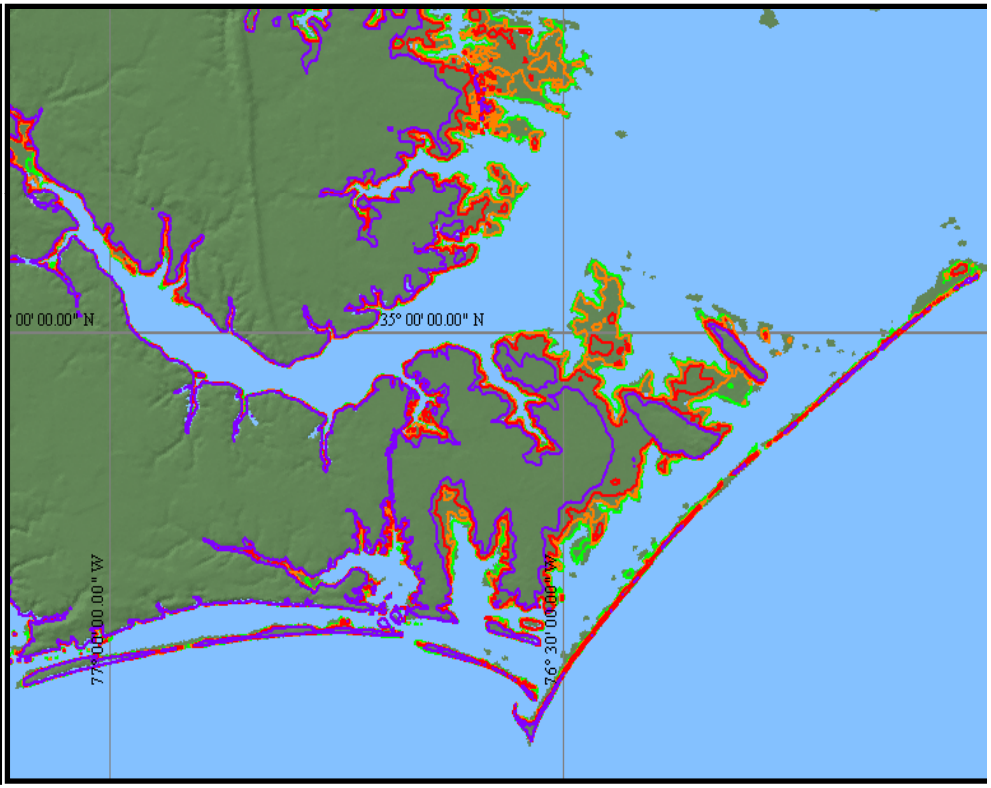
Changes in Shoreline Due to SLR

Static Mapping



Dynamic Modeling



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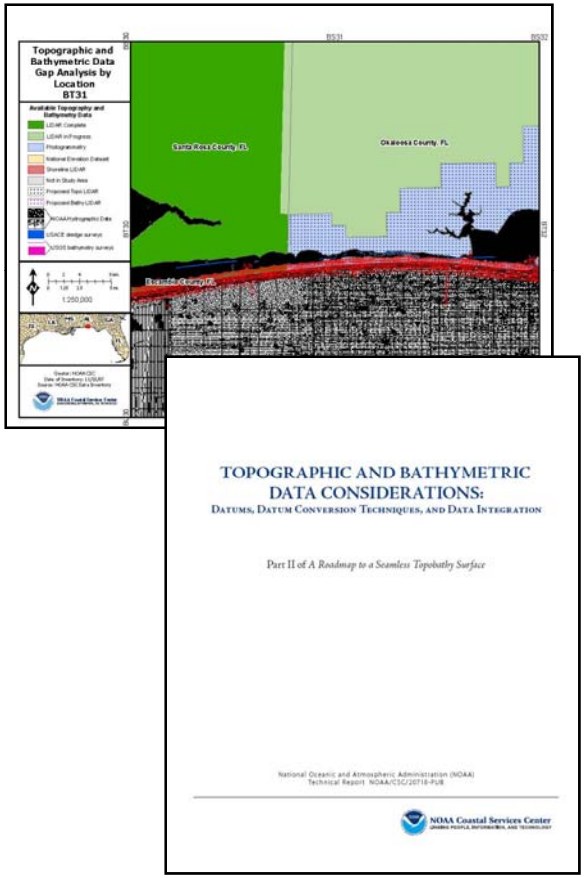
A Roadmap to a Seamless Topobathy Surface



Inventory of available topographic and bathymetric data for the Gulf of Mexico

Inventory and analysis of datum conversion and data integration techniques

Coming soon –

Investigation of digital elevation model (DEM) applications and general requirements for various applications

Inventory of topographic and bathymetric data for the Southeast U.S. and Hawaii

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NOAA Shoreline Website - Mozilla Firefox

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http://www.shoreline.noaa.gov/index.html

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NOAA Shoreline Website

Home About FAQs Glossary References

A Guide to National Shoreline Data and Terms

Mapping History **Applications** **Data Access** **Policy and Management**

Download Shoreline Data

By Name | By Application | By Scale

- NOAA National Shoreline
- NOAA Medium Resolution Shoreline
- NOAA OCS Shorelines
- NOAA Composite Shoreline
- USGS Vector Shorelines
- NGA World Vector Shoreline
- NGA Prototype Global Shoreline

- Is there a "national shoreline?"
- What is the legal U.S. shoreline?
- What is the total length of U.S. shoreline?

Read more Frequently Asked Questions

Shoreline Applications

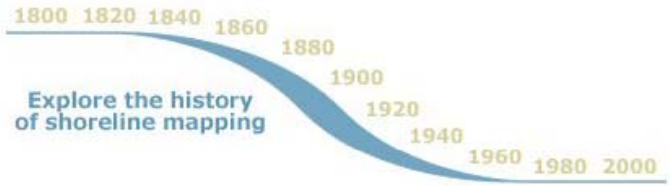
Shoreline Change Analysis

Cartographic Representation

Boundary Determination

Nautical Chart Production

Shoreline Mapping History



About NOAA Shoreline

The purpose of this website is to eliminate confusion about vector shoreline data by providing information about and access to shorelines that are generated by federal agencies. The site was developed and designed by the NOAA Coastal Services Center.

Read more about this site...

Done

DIGITAL COAST

Home Data Tools Training In Action

Because data alone is not enough...

Digital Coast gives organizations that manage coastal resources easy access to data and related resources.

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Learn more about the kinds of data available and download data for your area of interest.

Click here to learn about data types

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Digital Coast provides the total package needed by state, local, and non-profit organizations.

It not only offers easy access to downloadable data, but also the data-specific training, sample applications, and tools needed to address coastal issues.

Read more...

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Questions?

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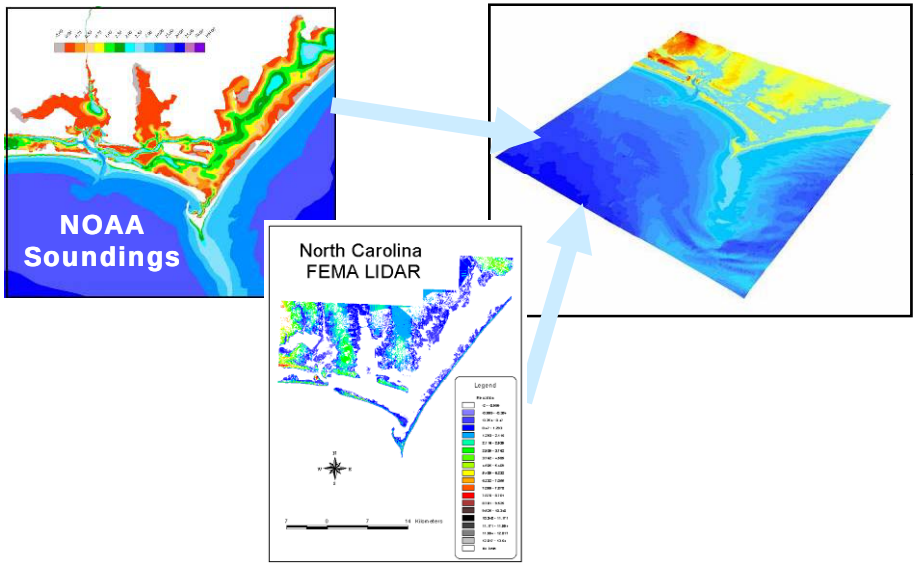
Modeling Shoreline Position with SLR

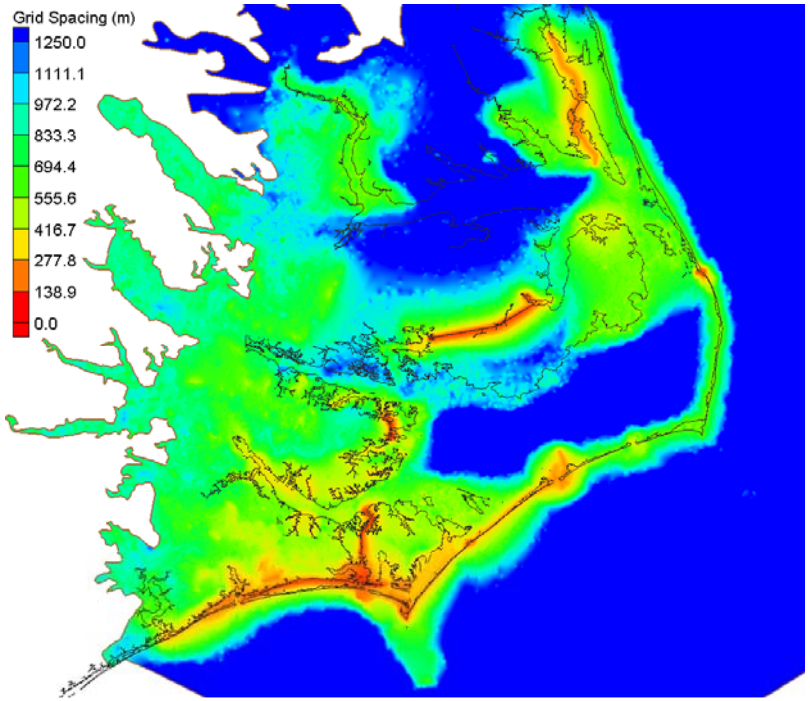
Data Source Accuracy



Vertical Accuracy

- 0.15-0.25 cm for lidar
- 0.30 cm for bathymetry (bathy) in less than 20 m of water

Model Resolution



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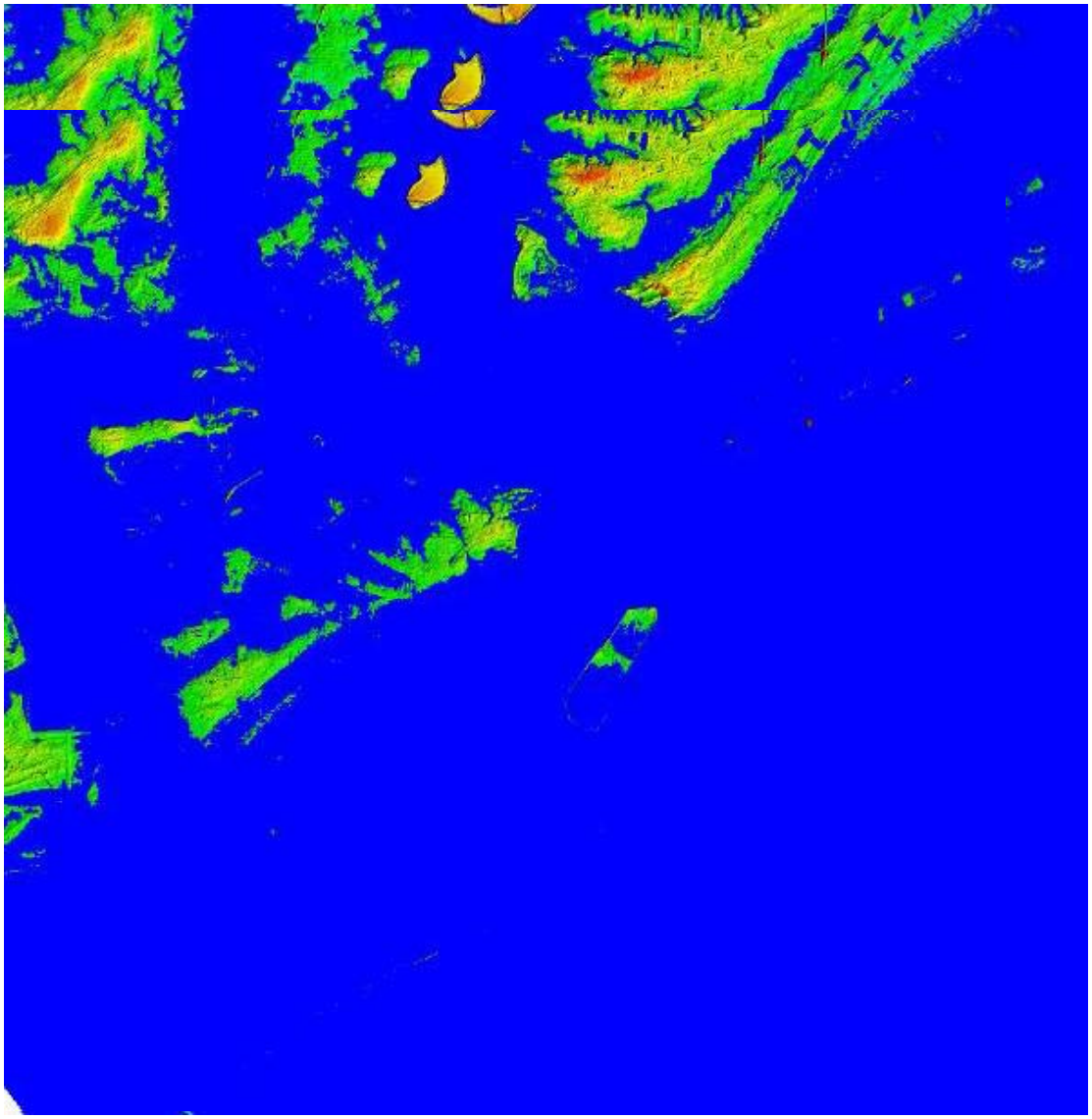
Both affect accuracy of predicted shoreline.

Sea Level Rise (SLR) and Storm Surge



Mean Sea Level

Mean High Water (MHW)

MHW + 0.6 meter (m)

MHW + 0.8m

Hurricane Hugo

Hugo + 0.8m

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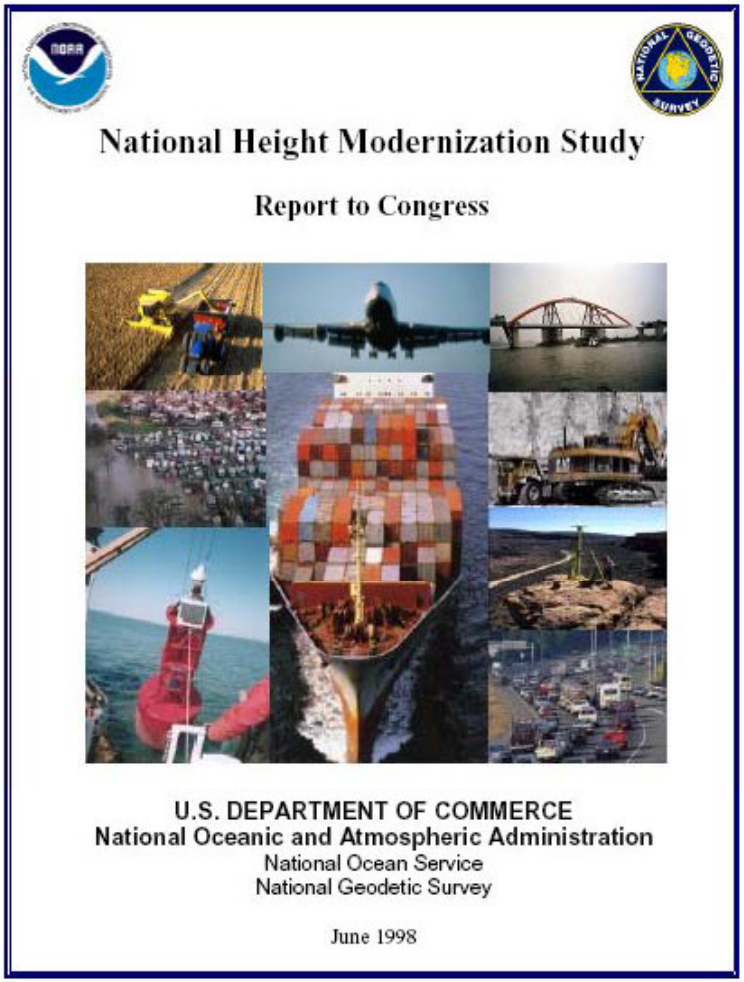
Height Modernization and Resilience Benefits

- Infrastructure design and location (e.g., levees, highways, pump stations, navigation channels)
- Accurate and cost-effective determination of floodplain boundaries
- Storm surge modeling and hurricane evacuation planning
- Accurate data for projects requiring precise elevation
- Improved disaster preparedness, recovery, economic development



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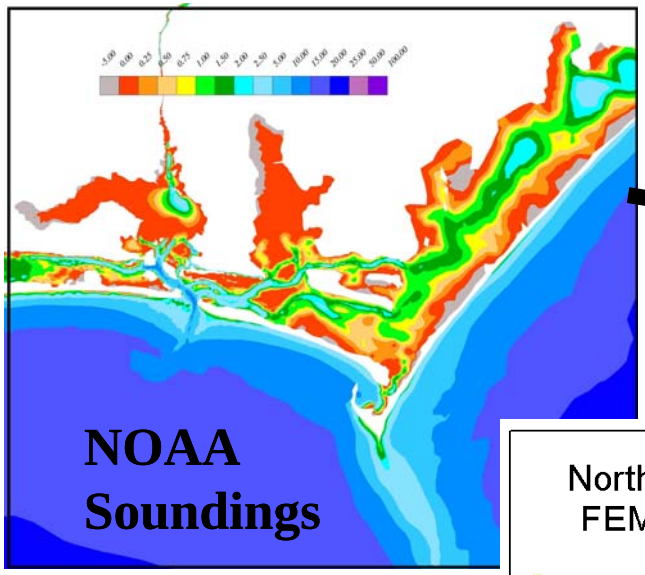
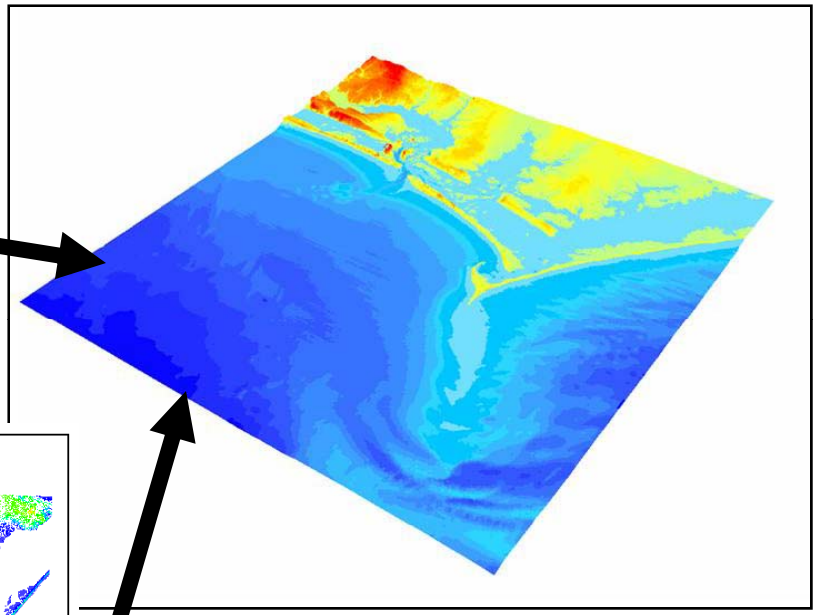
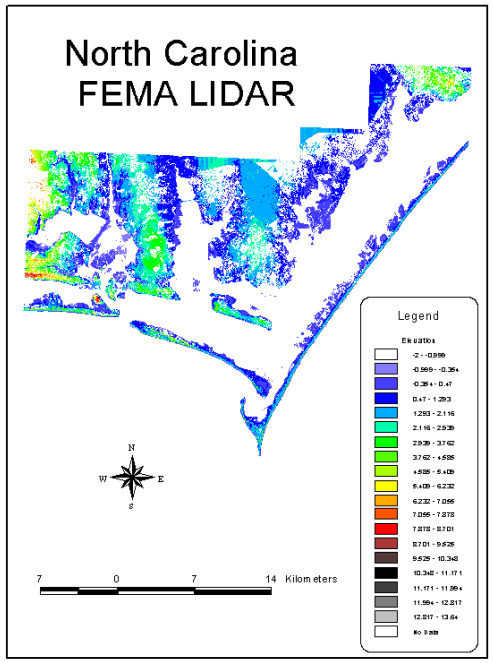
Creation of the Topographic and Bathymetric (Topobathy) Digital Elevation Model (DEM)

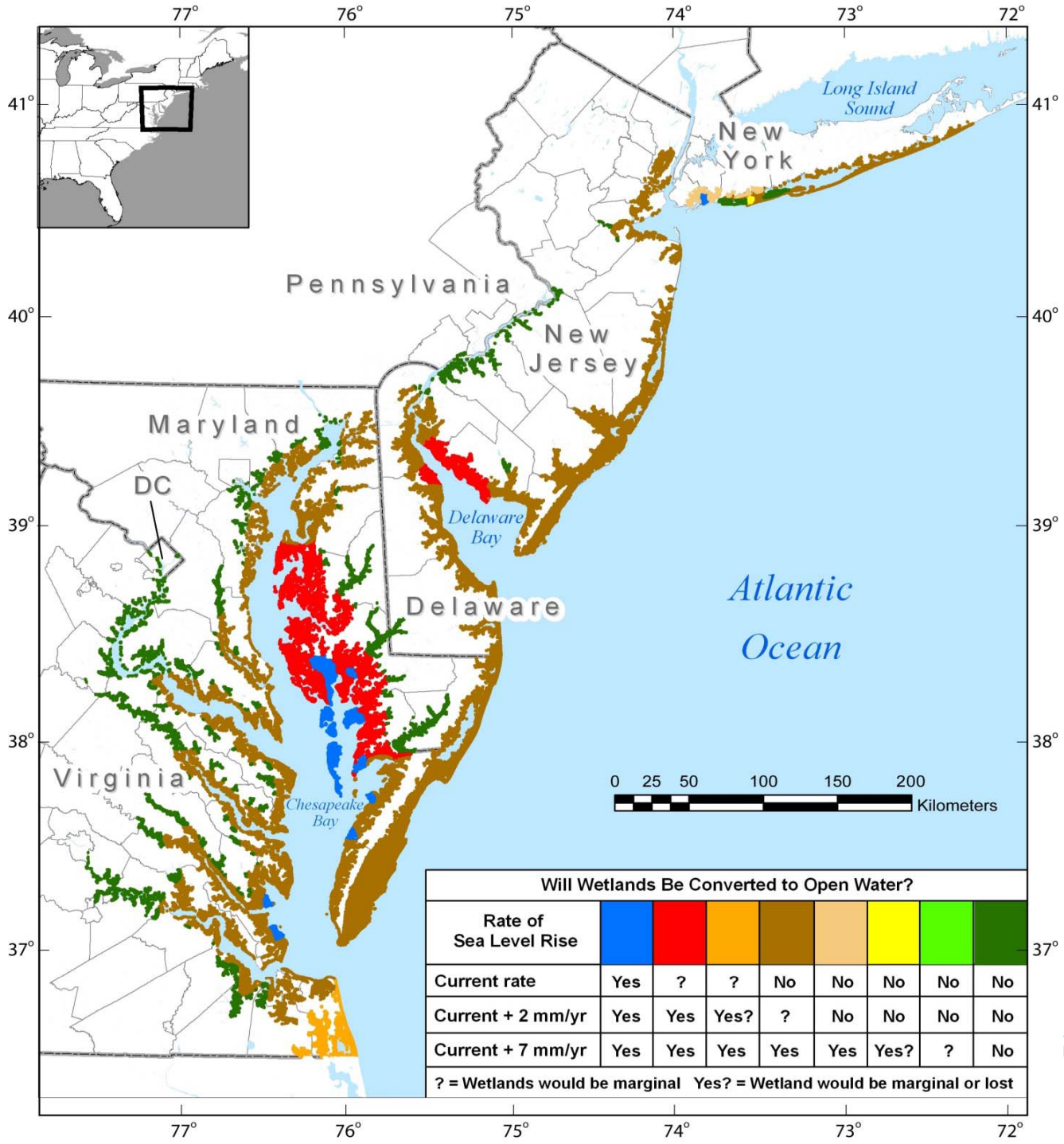


VDatum





- 6 m horizontal resolution
- Relative to NAVD 88
- Vertical accuracy:
- 0.25 centimeter (cm) for lidar
- 0.30 cm for bathy in less than 20 m of water



Current rate
+ 2 mm/yr
+ 7mm/yr

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